

In re Patent Application of:
AMMAR
Serial No. 10/647,674
Filing Date: August 25, 2003

In the Claims:

Claims 1-20 (CANCELLED)

21. (CURRENTLY AMENDED) A millimeter wave transceiver module comprising:

a single thick-film board comprising a plurality of layers; and

one or more microwave monolithic integrated circuit (MMIC) chips connected to said substrate board and operable to transmit and receive millimeter wavelength radio frequency (RF) signals, wherein said MMIC chips ~~are formed into one or more chip packages comprise a receive MMIC chip package, a transmitter MMIC chip package, and a local oscillator (LO) multiplier MMIC chip package.~~

Claim 22 (CANCELLED)

23. (CURRENTLY AMENDED) A millimeter wave transceiver module according to ~~claim 21 claim 22~~, wherein said receiver MMIC chip package, said transmitter MMIC chip package, and said local oscillator (LO) multiplier MMIC chip package are formed into a transceiver chip set.

24. (ORIGINAL) A millimeter wave transceiver module according to claim 23, wherein said transceiver chip set measures no more than about 0.2 to about 0.25 inches.

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25. (ORIGINAL) A millimeter wave transceiver module according to claim 23, wherein said receiver MMIC chip package comprises a multilayer thick film substrate board.

26. (ORIGINAL) A millimeter wave transceiver module according to claim 25, wherein said multilayer thick film substrate board comprises ceramic film.

27. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module comprising:

a substrate board;

a plurality of microwave monolithic integrated circuit (MMIC) chips supported by the substrate board and arranged in a receiver section, a local oscillator section, and a transmitter section; and

a plurality of filters and radio frequency interconnects formed on the substrate board and operative with and/or connecting the receiver, local oscillator and transmitter sections.

28. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 27, and further comprising electrical interconnects that are printed on the substrate board.

29. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 27, and further comprising a cutout formed within the substrate for receiving a MMIC chip for allowing direct attachment of the MMIC chip to

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a coefficient of thermal expansion (CTE) matched carrier or heat sink.

30. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 27, and further comprising at least one row of ground vias formed within the substrate board and providing isolation between at least the transmitter and the receiver sections formed on the substrate board.

31. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 27, wherein said transmitter, receiver and local oscillator sections are formed separated and sectioned from each other to enhance isolation and reduce oscillations.

32. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module comprising:

housing having a bottom plate and housing cover attached to the bottom plate

a substrate board positioned on the bottom plate and covered by the housing cover;

a plurality of microwave monolithic integrated circuit (MMIC) chips supported by the substrate board and arranged in a receiver section, a local oscillator section, and a transmitter section; and

a plurality of filters and radio frequency interconnects formed on the substrate board and operative with and/or connecting the receiver, local oscillator and transmitter sections.

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33. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 32, and further comprising electrical interconnects that are printed on the substrate board.

34. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 32, and further comprising a cutout formed within the substrate for receiving a MMIC chip for allowing direct attachment of the MMIC chip to a coefficient of thermal expansion (CTE) matched carrier or heat sink.

35. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 32, and further comprising at least one row of ground vias formed within the substrate board and providing isolation between at least the transmitter and the receiver sections formed on the substrate board.

36. (ORIGINAL) A millimeter wave (MMW) radio frequency transceiver module according to Claim 32, wherein said transmitter, receiver and local oscillator sections are formed substantially separated and sectioned from each other to enhance isolation and reduce oscillations.

37. (ORIGINAL) A method of forming a millimeter wave (MMW) radio frequency transceiver module comprising the steps of:

forming a substrate board;

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mounting a plurality of microwave monolithic integrated circuit (MMIC) chips on the substrate board such that the MMIC chips are arranged in a receiver section, a transmitter section and a local oscillator section;

forming a plurality of filters, radio frequency, and electrical interconnects that are operative with the receiver, local oscillator and transmitter sections.

38. (ORIGINAL) A method according to Claim 37, and further comprising the step of forming the transmitter, receiver, and local oscillator sections separated and sectioned from each other.

39. (ORIGINAL) A method according to Claim 37, and further comprising the step of forming ground vias to provide isolation between at least the transmitter and receiver sections.

40. (ORIGINAL) A method according to Claim 37, and further comprising the step of forming the substrate board from multilayer thick film ceramic material.